Process Tracing in the Study of Environmental Politics

Lisa Vanhala, University College London*

Abstract

This article surveys the use of process tracing as a method in research on global and comparative environmental politics. It finds that there has been reluctance on the part of scholars to explicitly embrace the method even though a great deal of environmental politics research relies on process-tracing and studies causal mechanisms. The article argues that the growing number of critiques that the subfield is overly descriptive and insufficiently focused on explanation is one consequence of the reluctance to explicitly embrace process-tracing. Drawing on recent debates in the philosophy of social science on causal mechanisms and a growing literature on how to trace processes this article outlines best practices in the application of the method in the study of environmental politics. The article considers some of the ways in which the use of process tracing in the subfield may be different from other areas of comparative politics and international relations.

* Thanks go to the journal editors and three anonymous reviewers for constructive comments that greatly improved this paper. The author is also grateful to Rob Abercrombie, Ben Cashore, Sébastien Jodoin, Sabine Saurruger, Paul Steinberg and audience members at the panel on Causal Mechanisms and Process-tracing in Global Environmental Politics at the 2016 annual meeting of the International Studies Association for helpful comments and discussions on earlier versions of this paper. Funding for this paper was provided by the Economic and Social Research Council Future Research Leaders scheme as part of a larger project (grant number ES/K008153/1).

Introduction

Process-tracing as a method has been the subject of a burgeoning literature in the field of qualitative research methods. Process-tracing involves the study of causal mechanisms that link antecedents with outcomes. Scholars interested in how best to study causal mechanisms have often come from an international relations or comparative politics background (Bennett and Checkel 2015; Gerring 2008; George and Bennett 2005; Collier 2011; Beach and Pedersen 2013). Yet the study of global environmental politics (GEP) and comparative environmental politics (CEP) has been largely neglected in these recent scholarly treatments of process-tracing and causal mechanisms. Equally, scholars of environmental politics (even many of those who use the method) have often been reluctant to describe their work as reliant on process-tracing and tend not to explicitly engage with the idea of causal mechanisms.

The lack of dialogue between these two bodies of literature is unfortunate for several reasons. First, many scholars of environmental politics on one hand and those who are developing process-tracing as a research practice on the other share a commitment to fine-grained case studies, pay close attention to historical narratives and are often sceptical of law-like theoretical statements that make little reference to the specifics of local context. Both bodies of scholarship have also converged on the view that some research problems are best addressed by combining an understanding of social and institutional structures with research on individual or organizational agency. Furthermore, scholars of environmental politics have long relied on process tracing in their research and offered early examples and innovations in the use of the method (Haas, Keohane and Levy 1993; Mitchell and Bernauer 2004; O'Neill et al. 2013; Steinberg and VanDeveer 2012; Zürn 1998). This work has made important contributions to the literature on international relations more generally in terms of thinking about, for example, how to explain the emergence and assess the effectiveness of international regimes, how to evaluate the causal role of ideas and knowledge in political

processes and how to trace the influence of non-state actors in global and domestic politics (see e.g. Haas 1991; Betsill and Correll 2001; Vormedal 2008). The lack of cross-fertilization between these bodies of work that share so much represents a missed opportunity for development of both the method and the study of environmental politics.

Furthermore, one of the implications of scholars of environmental politics not explicating their process-tracing method is that it has left the subfield vulnerable to a number of criticisms, including claims that the study of environmental politics has been overly reliant on descriptive single case studies and insufficiently focused on explanation. There have been a growing number of leading scholars calling for more reflection about the methodologies appropriate for the field of environmental politics (Cao et al. 2013; Hochstetler and Laituri 2014; Mitchell and Bernauer 2004; O'Neill et al. 2013; Steinberg and VanDeveer 2012). However, a close reading of many of the types of studies that are characterised as "descriptive" in fact reveals many important lessons that contribute to causal explanation and theory development. This is not necessarily the traditional understanding of causal explanation formulated as "covering laws" embraced by those who use large-N methods but it is causality nonetheless. The hesitancy in embracing the methodological framework of causal mechanisms and the reluctance to make the use of process-tracing transparent has meant that studies that are interested in explanation are often described as "descriptive".

This article explores the relationship between process-tracing methods and the study of environmental politics. I address the following questions: how has the method been used to date in the field of environmental politics? Why has there been reluctance on the part of scholars of environmental politics to explicitly embrace the process-tracing method? What are the consequences of this reluctance? What can the emerging literature on process-tracing offer to those who seek to study causal mechanisms in GEP and CEP? Are there distinctive

features of the study of environmental politics that scholars should bear in mind when using this method?

This paper is structured as follows. I begin with a brief discussion of the recent literature on the different understandings of causality in the philosophy of social sciences. This section explains what process tracing is (and outlines its variants) by drawing on recent work in qualitative methods. The second section then explores the use of process tracing in the study of environmental politics. It assesses the extent to which process tracing in particular has played a role in existing research in the field. I show why the field of environmental politics has been left open to the charge that it can be overly descriptive. Section three draws on two excellent recent volumes on process tracing (Beach and Pedersen 2013; Bennett and Checkel 2015) to discuss best practices in the use of this method and also to highlight some of the special considerations that may need to be borne in mind when undertaking process tracing analysis in the study of environmental politics. The final section offers some concluding thoughts.

Clarifying Concepts

There has been a good deal of contestation over a) what causal mechanisms are, b) what process tracing is and c) whether it is an inductive or deductive research approach (George and Bennett 2005; Gerring 2008). This section briefly summarizes the lines of contention and makes explicit the definitions relied on in this article.

How do we know causality when we see it? Two perspectives have come to dominate the ontological debate about causality in the social sciences (Beach and Pedersen 2013). First, scholars have pointed to work by David Hume and Carl Hempel who focused on a regular association between two factors as the defining feature of causality. Hume argued that causation is unobservable and therefore to establish causality three criteria for the relationship between X and Y need to be fulfilled: 1) X and Y must be contiguous in space and time; 2) X

must occur before Y and 3) a regular association must exist between X and Y (Beach and Pedersen 2013, 25). Hempel built on this work by focusing on covering laws which he described as statements about causation derived from observed regularity – a repeated relationship between a given antecedent and an outcome (Steinberg 2015, 164). For example, a regular association between governments that adopt stringent regulations on pollution emissions (X) and a subsequent improvement in air quality (Y) would, in a neo-Humean understanding, suggest the existence of a causal relationship between pollution regulation and air quality. However, it is important to note that in this perspective the actual causal process whereby regulations on emissions result in better air quality is black-boxed (Beach and Pedersen 2013, 25).

The second ontological position focuses on opening up this black-box of causality and the adoption of a mechanistic understanding of causality (Beach and Pedersen 2013, 25). This approach is less concerned with regularity of a relationship between antecedent and outcome and more concerned with the idea that X actually produces Y through a causal mechanism. Beach and Pedersen write: "The defining feature of a mechanismic ontology of causation is that we are interested in the theoretical process whereby X produces Y and in particular the transmission of what can be termed causal forces from X to Y" (2013, 25). They define a causal mechanism as "…a theory of a system of interlocking parts that transmits causal forces from X to Y" (2013, 29). Drawing on the example used above, the causal mechanism between pollution reduction regulations (X) and the improvement in air quality (Y) would consist of the transmission of information about new and stringent anti-pollution regulations to decision-makers within the polluting industries and their subsequent decisions to, for example, adopt pollution-minimizing technology or to shut down their operations and a subsequent decline in the levels of emissions into the air leading to an improvement in air quality.

Process tracing as a method is well suited for exploring causal mechanisms. This paper adopts the definition of process tracing recently put forward by Bennett and Checkel: "the analysis of evidence on processes, sequences, and conjunctures of events within a case for the purpose of either developing or testing hypotheses about causal mechanisms that might causally explain the case" (2015, 7). The detailed work required for process-tracing analyses can identify scope conditions for causal relationships (especially in comparative case studies), can help develop understandings of necessary and sufficient causation, can help unpack recursive causation and it can help in the discovery of new variables. One of the major strengths of process-tracing (when done well) is that it is useful in developing arguments against alternative hypotheses: fine-grained case studies allow for a consideration of competing and/or complementary explanations (Collier, Brady and Seawright 2010; Jacobs 2015; Mahoney 2008).

Beach and Pedersen point to three different variants of process tracing: theory testing, theory building and outcome-explaining. The first is what Bennett and Checkel (2015, 7) refer to as the "deductive theory-testing side of process tracing". This involves elucidating the observable implications of hypothesized causal mechanisms and examining this within a case to test whether a particular theory and its alternative explanations can account for the case at hand. The second type of process tracing relies on an inductive logic and aims to develop theory. This type of process-tracing draws on evidence from within a case to develop hypotheses that might explain the case or contribute to explanations of other cases. The third type of process-tracing is focused on "outcome explaining" and uses both inductive and deductive logics to offer a causal explanation of a specific case. Beach and Pedersen (2015) suggest that the characteristics that differentiate the three variants are whether they are theory-centric or case-centric designs (that is whether the focus and objective is engagement with theory or with a specific empirical case); aim to test or build theorized causal

mechanisms and their understanding of the generality of causal mechanisms; and the types of inference being made (2015: 13).

The Use of Process Tracing in the Field of Environmental Politics

To get a sense of how scholars of environmental politics have used process tracing I examined existing environmental politics research to identify the degree to which scholars actually use the process tracing method. To assess this I examined research articles in *Global Environmental Politics (GEP),* one of the leading journals focusing on environmental politics.[1] A review of research articles published between 2005 and 2015 (inclusive) found only fourteen out of 231 research articles (or 6 percent) included an explicit mention of the use of process-tracing. Arguably much of the research that is based on within-case analysis in case studies or comparative research can also be characterized as using process tracing but unless the author(s) specifically mentioned the technique it was excluded from this analysis. I also examined whether these articles were using process tracing mainly for theory-testing, theory-building or explaining a specific outcome (Beach and Pedersen 2013). Two articles out of the fourteen explicitly sought to build theory using process tracing (Tjernshaugen 2012; Van de Graaf 2013). I identified two articles that stated their goal was to test theory (Gabbler 2010; Gulbrandsen 2008), one article mentioned process tracing in its discussion of a monograph (Miles 2006) and the remaining ten articles can all be characterised as presenting themselves as primarily seeking to explain the outcome of a specific case study (or several cases) (Torney 2015; Kashwan 2015; Kauffman and Marin 2014; Ciplet 2014; Fuentes-George 2013; Meckling 2011; Andonova 2010; Vormedal 2008; Selin 2007).

The slim proportion of articles that are explicitly based on process tracing analysis is surprising. It has been taken for granted in recent reflections on the use of research methods

[1] I am not claiming that research in this journal is a microcosm of the whole breadth of literature in the study of environmental politics. Process tracing has played an important role in much research that is published in monographs and, arguably, the results of process tracing analyses are more amenable to dissemination in book-length formats because of the richly detailed discussion required to do the analysis justice.

in the study of environmental politics that process tracing has been one of the core methods relied on by researchers in this subfield (Steinberg and VanDeveer 2012; Mitchell and Bernauer 2004; O'Neill et al. 2013). For example, in their review of methods in the study of international environmental politics Kate O'Neill and her co-authors (2013) describe the research approach that dominated the first few decades of research on global environmental regimes. They point out that "…scholars frequently selected a particular regime and meticulously traced out the linkages between 'possible causes and observed outcomes' – that is, using process tracing – to identify the causal mechanisms at each critical stage to explain the emergence and, sometimes, the evolution of the regime" (O'Neill et al. 2013, 448). It is clear that there is a significant disjuncture between the numbers of scholars who explicitly state that they are using process tracing in their research and the fact that a good deal of excellent qualitative research on environmental politics in fact relies on fine-grained historical analysis, draws on a wide range of sources of evidence and seeks to contribute to causal explanations.

The Reluctance to Explicitly Embrace Process Tracing

What explains this reluctance on the part of scholars of environmental politics to *explicitly* embrace the process tracing method? I suggest here that, until recently, ambiguity in terms of the ontological and epistemological implications of process tracing meant that scholars across theoretical persuasions were reluctant to tie their research to this method for a number of different reasons.

For some, the term "process tracing" has implied a sole focus on micro-level actors and processes. Earlier research in IR that explicitly embraced process tracing often examined decision-making processes among political elites at the national level, often in times of security crises (Bennett 1999). This type of work is quite distant to the substantive focus of global environmental politics, which by its very nature, is implicitly cognizant of global

forces, structures and interconnectedness. The apparent micro-level focus of process-tracing did not leave sufficient room for manoeuvre for those interested in institutional structures as well as for scholars interested in relational, ideational and discursive forces.

For other scholars process tracing was understood as a deductive approach to research: a way to test theories and further explore correlations identified as a result of large-N research. George and Bennett's (2005) definition of process tracing set the stage for this: they saw process tracing as the use of "histories, archival documents, interview transcripts, and other sources to see whether the causal process a theory hypothesizes or implies in a case is in fact evident in the sequence and values of the intervening variables in that case" (George and Bennett 2005, 6). As Bennett and Checkel (2015) point out the term "intervening variable" has caused a good degree of confusion among social scientists more widely (and notably they abandon this definition in their recent work) but in the interim the standard understanding of process-tracing has tended to side-line inductive research as well as research that does not seek to explain the social world in terms of variable-based relationships.

Finally, and related to the above, process-tracing has historically been associated with positivist research. Thus in the field of global environmental politics, where constructivist theoretical approaches have often been developed and applied (e.g. Haas 1990), it is perhaps unsurprising that there is a reluctance to explicitly embrace a method that, for some, has other ontological underpinnings. However, ways of reconciling the practice of process tracing with interpretivist/constructivist and even post positivist approaches have appeared in the methodological literature in recent years. Vincent Pouliot's drive to establish "practice tracing" as an interpretivist method that takes processes seriously is just one example (Pouliot 2010; 2015; see also Risse et al 2013; Hopf 2007; Hansen 2006). In short, the term "process tracing" has meant many things to many people which may explain why scholars of

environmental politics have been reluctant to use the term, even when undertaking the type of research that would fall into this category.

The Implications of this Reluctance

One of the implications of scholars not explicating their process-tracing method is that it has left the field as a whole vulnerable to a number of criticisms, including claims that the study of environmental politics has been overly reliant on descriptive single case studies and insufficiently focused on explanation (Cao et al. 2013; Hochstetler and Laituri 2014; O'Neill et al. 2013; Steinberg and VanDeveer 2012 but see Mitchell and Bernauer 2004). While there is acknowledgement that description serves an important purpose in the accumulation of knowledge, there is also an emerging consensus that scholars working in the field of environmental politics now need to place more emphasis on explanation.

However, researchers use the term "explanation" to mean many things. Some scholars are advocating for more large-N research. Xun Cao and his co-authors (2013) argue that a good explanation involves, at a minimum, "…showing that some factors are at least probabilistically associated with an observable pattern and, second, giving a theoretical account of why those factors affect what we observe" (Cao et al 2013, 293). Their emphasis on probabilistic causality suggests an ontological approach among Cao et al. that privileges cross-case – and particularly large-N – methods. Certainly Cao and his co-authors explicitly argue that some areas in the study of environmental politics should be the subject of more quantitative research. For example, they suggest that "the considerable body of case study literature on citizen involvement and pressure group processes needs to be supplemented by such large-N research that enables other factors to be controlled for in a way that is difficult using process tracing" (Cao et al. 2013, 294).

However, the recent literature in qualitative methods discussed in the preceding section suggests that this mischaracterizes what process-tracing is as a research practice and

underestimates how it can help scholars contribute to causal explanations. Scholars of environmental politics have long been cognizant of the strengths of qualitative methods and defended against the charge of the field being overly descriptive. Mitchell and Bernauer (1998) suggest, "Case studies have a major advantage over quantitative methods…, because they allow disaggregated and in-depth analysis of such 'causal mechanisms' or 'causal pathways'. Detailed causal narratives or 'process-tracing' are more than mere storytelling" (1998: 22). Similarly, Homer-Dixon (1996) argues that complex ecological-political systems involve interactive, non-linear and sometimes recursive causal relationships that may only be possible to study using qualitative methods such as process-tracing. Because of the complexity, multiscalarity, likelihood of feedback effects and potentially expansive temporal distances between causes and outcomes in environmental politics, many scholars who study this field are interested in exploring the actual mechanisms that link potential causes and outcomes rather than identifying average causal effects across a large population of cases. The next section draws on the recent literature on process tracing to consider how to put this method into practice in the study of environmental politics.

How Should we Trace Processes when Studying Environmental Politics?

Recent literature has identified a number of practices that scholars can use to answer the question "How do we know a particular piece of process tracing research is good process tracing?" (Bennett and Checkel 2015, 20). This section builds on this by considering how to trace processes in the study of environmental politics specifically. First, this section briefly describes several features of the study of environmental politics that may, at times, differentiate it from other areas of the study of politics and international relations that may require scholars to take into account other considerations when putting the process tracing method into practice.

Scope Conditions: What is Distinctive about the Study of Environmental Politics?

First, the complexity of the social world in terms of its relationship to environmental governance requires researchers to carefully untangle causality over multiple levels of government. As Steinberg and VanDeveer write "…in contrast to the traditional subjects of international diplomacy, such as military relations and trade – the success of international environmental policy typically requires reforms at multiple levels of social organization…international environmental regimes consist of agreements among governments to change private behavior within their borders" (2012, 11). The spatial and temporal scope of environmental problems rarely coincides neatly with the remit of the institutions responsible for addressing them (Steinberg and VanDeveer 2012). Many environmental problems and their solutions are complex and not fully understood: policies that deal with one problem may have unintended, damaging consequences elsewhere. For example in the 1950s local air pollution in Britain's industrial towns was reduced by building taller factory chimneys. Many years later the increase in acid rain falling in Scandinavia was linked to this "solution" in Britain.

Second, a key distinction lies in the fact that environmental problems and governance are organically linked to nature (Hochstetler and Laituri 2014). This has both practical and ontological implications in terms of the use of process-tracing. Practically, examining causal mechanisms might mean a researcher has to grapple with research in the physical and natural sciences. For example, a scholar interested in whether emissions trading systems have contributed to reductions in greenhouse gases might have to deal with complex pollution measurement models or a researcher interested in the link between land-use conflicts and environmental degradation might turn to GIS analysis. This link to natural phenomena will require researchers to grapple with the ontological underpinnings of their work. For example, this type of work might require a researcher to reconcile a scientific realist position from the

hard sciences when interpreting emissions or GIS data with an interpretivist approach to the social sciences.

Third, the range of actors included in analyses of environmental politics is, arguably, broader than in some other areas of international relations such as security studies and trade. Non-state actors can both cause environmental problems and/or act as drivers or participants in policy-making to address these problems. The literature on environmental politics documents how and why NGOs, social movements and corporations play an important role in environmental politics from international negotiations (Betsill and Correll 2007; Vormedal 2008) to local level politics (Koehn 2008; Selin and VanDeveer 2005).

Not all of these considerations will be of importance for all types of research questions scholars of environmental politics may be interested in addressing. However, it is important to consider what they might mean for the application of the process tracing method in the subfield in case one (or more) of these defining characteristics becomes of relevance in a research project in either the types of theory being engaged with or the sources or types of evidence being relied upon.

How should we trace processes when studying environmental politics?

Bennett and Checkel (2015) have developed criteria for assessing applications of process tracing that aim to be systematic, operational and transparent (2015: 21). They argue for a three-part standard of what counts as a good example of process tracing:

> *Meta-theoretically*, it will be grounded in a philosophical base that is ontologically consistent with mechanism-based understandings of social reality and methodologically plural… *Contextually*, it will utilize this pluralism both to reconstruct carefully hypothesized causal processes and keep sight of broader structural-discursive contexts. *Methodologically*, it will take equifinality seriously and consider the alternative causal pathways through which the outcome of interest might have occurred (Bennett and Checkel 2015: 20).

Based on these standards they identify ten best practices for applications of process tracing. The first four are general criteria that might apply to many types of qualitative methods: "cast the net widely for alternative explanations"; "be equally tough on the alternative explanations"; "consider the potential biases of evidentiary sources"; "take into account whether the case is most or least likely for alternative explanations" (Bennett and Checkel 2015: 21). The remaining criteria all concern ways of doing process tracing that can serve as defences against claims of "cherry picking" cases or evidence: "make justifiable decisions on when to start and stop"; "be relentless in gathering diverse and relevant evidence"; "combine process tracing with case comparisons"; "be open to inductive insights"; "use deduction to ask 'if my explanation is true, what will be the specific process leading to the outcome?'" and remember that "conclusive process tracing is good, but not all good process tracing is conclusive" (Bennett and Checkel 2015: 21).

For scholars of environmental politics several additional considerations are worth bearing in mind. First, in following Bennett and Checkel's (2015) advice on considering alternative explanations it is worth bearing in mind that in the area of environmental politics these may be operative at other levels of governance or through other forms of governance, such as private governance mechanisms. For example, research on the rise of carbon trading as a policy response to climate change has examined the role of liberal norms at both the international institutional and domestic policy level (Bernstein 2001); the role of supranational institutions such as the European Commission (Skjaerseth and Wettestad 2008); the role of global capital operative at the subnational, national and global levels (Matthews and Paterson 2005; Newell and Paterson 2010); the role of financial service centers, such as New York and London, which bridge the local and global level (Knox-Hayes 2009) and finally the role of business coalitions operating at the transnational level (Meckling 2011). A comprehensive account of the globalization of greenhouse gas emissions trading

schemes would consider these types of trends operating across scales of governance and through private and hybrid (public-private) forms of governance (Cashore et al. 2004; Andonova 2010).

Second, Bennett and Checkel's (2015) exhortation to consider the potential biases of evidentiary sources is particularly important in studying environmental politics because of the broad range of potential actors involved in an issue area. The potential influence of international organizations, national governments, sub-state actors, transnational actors and non-state actors on outcomes should be included in considerations of alternative explanations. If an actor/organization/institution claims that they played a role in achieving a particular goal than there is an extra onus on the researcher to verify the validity of this claim using sources of evidence other than those produced by the actor itself. A good example of process-tracing analysis which draws on this type of evidence is research by David Ciplet (2014) to develop an explanation of why transnational advocacy networks (TANs) are able to achieve their rights goals. Ciplet (2014) draws on a comparative case study of three TANs in the climate change regime and uses process-tracing to link advocacy efforts with impacts within each case. Ciplet (2014) draws on a wide range of data collected through participant observation and interviews and informal conversations as well as UNFCCC documents, archival video footage, academic publications, governmental reports and other official documents, international organizations' papers, NGO statements, and press articles. The strength of the analysis is that when a claim made by a particular actor is reported in the research it is either supported by additional evidence or the tensions between the actor's claim and other evidence is presented which allows to reader to draw their own conclusions.

Third, Bennett and Checkel (2015) suggest that social scientists should pay particular attention to justifying when they start their process tracing analysis (also see Falleti and Lynch 2009). In the area of environmental politics, which is often concerned with identifying

the political causes of environmental degradation or the potential governance solutions to environmental problems we sometimes need to take very long time horizons in examining causal relationships. In this way this subfield is often different from much of political science which Paul Pierson suggests focuses on "causes and outcomes that are both temporally contiguous and rapidly unfolding" (Pierson 2004: 79). Because so many societally-induced environmental phenomena are "slow moving" either as outcomes or in their causal roots there is the potential to miss a lot when our analytical time horizon is relatively narrow (Pierson 2004). Vanhala and Hestbaek (2016) take this into account in their explanation of the ideational factors leading to the 2013 adoption of the Warsaw International Mechanisms on Loss and Damage Associated with Climate Change Impacts. They adopt a three-pronged methodology as part of their process tracing analysis: a content analysis, a historical mapping exercise and a frame analysis. The content analysis relied on coverage of the negotiations through two newsletters *ECO* and *Earth Negotiations Bulletin* over a decade. It relied on an open-ended approach that allowed the authors to consider changing meanings of key terms over time. The research also builds a historical account of the way in which state parties and non-state actors tried to define and institutionalize particular understandings of loss and damage at particular points in time between the early 1990s and the early 2010s. The authors rely on submissions by the state parties, NGO reports, UNFCCC reports and summaries of meetings as well as a number of interviews with negotiators, legal advisors and NGO officers. By situating the content analysis and frame analysis within a macro-historical perspective the research is able to offer insights into the subtle changes in the influence of ideas of loss and damage on policy over time.

Beach and Pedersen's (2015) different variants of process tracing have been present in existing literature on environmental politics. Two examples are discussed in detail here to highlight best practice in the use of process tracing analysis.

An excellent example of theory-testing process tracing is Lars Gulbrandsen's (2008) research on what explains the differences in forest protection performance between Sweden and Norway. In his research he tests three alternative explanations exploring the ways in which science influences policy: first he looks at a rational-instrumental approach which examines the state of knowledge about environmental protection needs; second he tests a political-institutional approach where he looks at the levels of access different stakeholders have to the science-policy dialogue; and third, he tests a political economy approach where he examines the distribution of costs and benefits in the forestry sector.

The comparative case-study design allows for a systematic examination of similarities and differences between the cases. This research design is used in combination with process tracing within each case, identifying causal chains of events and path dependencies that resulted in particular outcomes. The data in the study consists of primary documents such as scientific reports, environmental assessments and public policy documents; 22 interviews with researchers, policy-makers, environmentalists and forest owners across the two countries; and secondary sources. The author traces the history of the policy area in each country and then structures the analysis and assessment of evidence according to the three main theoretical approaches being tested. Gulbrandsen (2008) finds Sweden has protected more forestland and enacted stricter environmental protection rules than Norway. The process tracing and comparative analysis shows that variation in access to the science-policy dialogue and in the policy process itself rather than in differences in the state of knowledge of environmental protection requirements in the two countries drove the different outcomes. Another finding is that variation in the distribution of costs and benefits in the Swedish and Norwegian forestry sectors was important for explaining divergence in the stringency of forest certification standards in the two countries. Together the analysis shows that:

> science can take on different roles in rule-making processes, depending on access to the science-policy dialogue, organization of the policy process, and

> the interests at stake. Even conclusive scientific evidence about the causes of the environmental problem at hand seems to have little influence on policies when powerful economic counter-forces are involved in the decision-making process (Gulbrandsen 2008: 118).

There are many strengths of the process tracing analysis in Gulbrandsen's (2008) research. The research design allows the author to explore competing theoretical propositions in a convincing manner: he outlines the broader theoretical foundation for each proposition and clearly lays out what the alternative approaches would lead the reader to expect in terms of process and outcomes. However, Gulbrandsen (2008) also recognizes that these approaches can be combined to explain varying outcomes and bears this in mind in the final analysis. The research relies on a wide variety of sources of evidence and links the data to the alternative theoretical propositions in the way he structures the analysis. Gulbrandsen (2008) also explicitly limits the scope of the study in a helpful way by highlighting that other explanations, not related to the science-policy interface, are possible but that the scope of the study is focused on the influence of knowledge in rule-making processes.

An example of research that could be categorised as both "outcome explaining" and "theory-building" process tracing is the work of Andreas Tjernshaugen (2012) which seeks to explain variation in corporations' carbon capture and storage (CCS) activities and strategies through a comparative study of three multinational oil and gas corporations. The author is explicit about his inductive approach and the relationship between data and theory development at the outset:

> The explanatory framework is explicitly grounded in the empirical data on the three cases as well as in concepts taken from the literature. Consequently, the study is not a test of hypotheses deductively generated from theory. Instead, it represents a heuristic use of case studies, which "inductively identifies new variables, hypotheses, causal mechanisms, and causal paths" (Tjernshaugen 2012: 9)

Like Gulbrandsen (2008) the article combines comparative analysis with detailed within-case process tracing. The cases studied – ExxonMobil, BP and Statoil – offer variation in approaches to climate change and CCS and the author divides the case study into three historical periods: up to 1996; from 1997 to 2000 and from 2001 to 2008. The author collected extensive secondary and primary data including: news coverage, company literature (magazines, reports, documents etc from the ExxonMobil Historical Collection at the University of Texas at Austin); material from the International Energy Agency Greenhouse Gas Research and Development Programme (news bulletins, an online CCS database, proceedings from the biannual Greenhouse Gas Control Technologies (GHGT) conferences; participant observation at several international meetings on CCS and 15 interviews with "well-informed" individuals including executives of the three companies (Tjernshaugen 2012: 9).

The explanatory framework developed in this article emphasizes three dimensions: general corporate climate strategies, the increasing institutionalization of CCS, and other more or less company-specific factors. The author draws on the interaction of these three explanatory strands to address the empirical puzzle of changes of relative involvement by Exxon and BP in CCS activities and strategies over time. Exxon/ExxonMobil was first to make plans for a major, pioneering CCS project, but later pursued a relatively cautious strategy. In contrast, BP showed little interest in CCS up until 1997, but from that point on developed a particularly ambitious strategy. In doing so the author is able to identify the factors causing the specific outcomes of interest but also develops a more general explanatory framework that could be taken forward to explore other areas of corporate involvement in the development of mitigation options (Tjernshaugen 2012: 26).

The "outcome explaining" form of process tracing analysis has been the most common variant deployed (at least explicitly) in the research that has been published in

Global Environmental Politics. Tjernshaugen's (2012) piece goes beyond just explaining the reasons behind the empirical outcomes to show how an inductive approach can also be useful in developing theoretical explanations. Another strength of this piece of research is the structured, systematic approach to case selection and analysis over time which is useful in both highlighting the empirical puzzle in the first place but also in identifying the causal forces at play cross-temporally.

Conclusion

Hochstetler and Laituri (2014) suggest that "[r]esearchers in international environmental politics (IEP) have devoted little attention to their field's methods. With a few exceptions, they have simply carried out their research without exploring which methods are best for the field as a whole" (Hochstetler and Laituri 2014, 78). This research suggests that this has begun to have implications in terms of the types of criticisms that are directed at small-n research in the field: namely that it is too descriptive and insufficiently focused on explanation (Cao et al 2013). I have argued here that these criticisms may suggest, rather than an accurate description of the weaknesses of the field, divergences in the types of causality scholars are interested in exploring.

This article has also sought to highlight some of the distinctive features of the study of environmental politics that should be borne in mind by scholars who use the process-tracing method. The fact that environmental governance occurs over multiple geographic scales, over long time spans, and that it is practiced by both public and private authorities matters for the way that we should trace processes. The aim here is to encourage scholars, many who already use process-tracing tools, to explicitly embrace the newly systematized techniques available in order to raise the ambition of scholarship in this area with respect to contributing to the development of theory. This article represents a first step in thinking about how to use process tracing more effectively in the subfield. However, future research should consider the

relationship between process tracing and other methods (e.g. large-N analysis, qualitative comparative analysis) in terms of whether they complement each other or whether they might be ontologically inconsistent.

Another area of methodological development that may be of interest to scholars wishing to carry these ideas forward concerns the methodological relationship between the past and the future. Scholars of environmental politics who use process-tracing may also want to consider carrying their findings forward by "looking into the future" with the help of new techniques of modelling and scenario building (MSB). O'Neill and her co-authors (2013) have shown how the use of MSB can in fact help those interested in GEP engage with the challenges of muliscalarity and horizontal linkages. "Years of research on the politics of climate change have revealed the need to develop methodological approaches and models that adapt over time and space as a result of the feedbacks and underlying complexities of the problems at hand, precisely because historical norms and explanations for past behavior may change and hence, not serve as a guide to future norms and behaviors" (O'Neill et al. 2013, 445). Linking the findings of process tracing analysis with MSB could be fruitful in terms of our ability to consider potential futures.

Biography

Lisa Vanhala is a Senior Lecturer (Associate Professor) in Political Science at University College London. She received her doctorate from Nuffield College at Oxford University. Her recent work explores the role of NGOs in environmental politics in a comparative manner, the intersection of climate change and human rights and the global politics of climate change loss and damage. Her recent research is published in *Comparative Political Studies, Global Environmental Politics, Law & Policy* and *Journal of European Public Policy.*

Bibliography

Andonova, Liliana. 2010. Public-Private Partnerships for the Earth: Politics and Patterns of Hybrid Authority in the Multilateral System. *Global Environmental Politics* 10(2): 25-53.

Beach, Derek and Rasmus Brun Pedersen. 2013. *Process-Tracing Methods: Foundations and Guidelines*. Ann Arbor: University of Michigan Press.

Betsill Michele and Elisabeth Corell. 2008. NGO Diplomacy: The Influence of Nongovernmental Organizations in International Environmental Negotiations. Cambridge, MA: MIT Press.

Bennett, Andrew and Jeffrey T. Checkel. 2015. Process tracing: From philosophical roots to best practices. In *Process Tracing: From Metaphor to Analytic Tool*, edited by Andrew Bennett and Jeffrey T. Checkel, 3-37. New York: Cambridge University Press.

Bernstein, Steven. 2001. *The Compromise of Liberal Environmentalism*. New York: Columbia University Press.

Bernstein, Steven and Benjamin Cashore. 2000. Globalization, Four Paths of Internationalization and Domestic Policy Change: The Case of Eco-forestry in British Columbia, Canada. *Canadian Journal of Political Science* 33(1): 67-99.

Breitmeier, Helmut, Oran Young and Michael Zürn. 2006. *Analyzing International Environmental Regimes: From Case Study to Database*. Cambridge, MA: MIT Press

Cao, Xun, Helen V. Milner, Aseem Prakash and Hugh Ward. 2013. Research Frontiers in Comparative and International Environmental Politics: An Introduction. *Comparative Political Studies* 47(3): 291-308.

Ciplet, David. 2014. Contesting Climate Injustice: Transnational Advocacy Network Struggles for Rights in UN Climate Politics. *Global Environmental Politics* 14(4): 75-96.

Cashore, Benhamin, Graeme Auld and Deanna Newsom. 2004. *Governing Through Markets: Forest Certification and the Emergence of Non-State Authority*. Yale University Press, London and New Haven.

Falleti, Tulia G. and Julia F. Lynch. 2009. Context and Causal Mechanisms in Political Analysis. *Comparative Political Studies* 42(9): 1143-1166.

Fuentes-George. Kemi. 2013. Neoliberalism, Environmental Justice, and the Convention on Biological Diversity: How Problematizing the Commodification of Nature Affects Regime Effectiveness. *Global Environmental Politics* 13(4): 144-163.

George, Alexander L., and Andrew Bennett. 2005. *Case Studies and Theory Development in the Social Sciences*. Cambridge, MA: MIT Press.

Gerring, John. 2007. Is There a (Viable) Crucial-case Method? *Comparative Political Studies* 40 (3): 231–253.

Gulbrandsen, Lars H. (2008) the Role of Science in Environmental Governance: Competing Knowledge Producers in Swedish and Norwegian Forestry. *Global Environmental Politics* 8(2): 99-122.

Hansen, Lene. 2006. *Security as Practice: Discourse Analysis and the Bosnian War*. London, New York: Routledge.

Hochstetler, Kathryn and Melina Laituri. 2014. Methods in International Environmental Politics. In *Advances in International Environmental Politics*, edited by Michele M Betsill, Kathryn Hochstetler, and Dimitris Stevis. New York: Palgrave Macmillan.

Homer-Dixon Thomas. 1996. Strategies for studying causation in complex ecological-social systems. *The Journal of Environment and Development*. 5:132–48

Hopf, Ted. 2007. The Limits of Interpreting Evidence. In *Theory and Evidence in Comparative Politics and International Relations*, edited by Richard Ned Lebow and Mark Irving Lichbach. London: Palgrave Macmillan, pp. 55-84.

Jacobs, Alan. 2015. Process tracing the effects of ideas. In *Process Tracing: From Metaphor to Analytic Tool*, edited by Andrew Bennett and Jeffrey T. Checkel, 41-73. New York: Cambridge University Press.

Kashwan, Prakash. 2015. Forest Policy, Institutions, and REDD+ in India, Tanzania, and Mexico. *Global Environmental Politics* 15(3): 95-117.

Kauffman, Craig and Pamela Marin. 2014. Scaling up Buen Vivir: Globalizing Local Environmental Governance from Ecuador. *Global Environmental Politics* 14(1): 40-58.

Koehn, Peter. 2008. Underneath Kyoto: Emerging Subnational Government Initiatives and Incipient Issue-Bundling Opportunities in China and the United States. *Global Environmental Politics* 8(1): 53-77.

Knox-Hayes, Janelle. 2009. The Developing Carbon Financial Service Industry: Expertise, Adaptation and Complementarity in London and New York. *Journal of Economic Geography* 9(6): 749–777.

Mahoney, James. 2010. After KKV: The New Methodology of Qualitative Research. *World Politics* 62: 120–47

Mahoney, James. 2001. Beyond Correlational Analysis: Recent Innovations in Theory and Method. *Sociological Forum.* 16(3): 575-593.

Matthews, Karine, and Matthew Paterson. 2005. Boom or Dust? The Economic Engine Behind the Drive for Climate Change Policy. *Global Change, Peace and Security* (17): 59–75.

McKeown, Timothy J. 2010. "Case Studies and the Limits of the Quantitative Worldview". In *Rethinking Social Inquiry: Diverse Tools, Shared Standards*, 139–168, edited by Henry E. Brady and David Collier. Lanham, MD: Rowman & Littlefield Publishers.

Meckling, Jonas. 2011. The Globalization of Carbon Trading: Transnational Buisness Coalitions in Climate Politics. *Global Environmental Politics* 11(2): 26-50.

Mitchell, Ronald and Thomas Bernauer. 1998 Empirical Research on International Environmental Policy: Designing Qualitative Case Studies. *Journal of Environment and Development* 7(1): 4-31.

Mitchell, Ronald and Thomas Bernauer. 2004. Beyond story-telling: designing case study research in international environmental policy in *Models, Numbers, and Cases: Methods for Studying International Relations*, edited by DF Sprinz, Y Wolinsky-Nahmias, pp. 81–106.

Newell, Peter, and Matthew Paterson. 2010. *Climate Capitalism: Global Warming and the Transformation of the Global Economy*. Cambridge: Cambridge University Press.

O'Neill, Kate, Erika Weinthal, Kiberly R. Marion Siuseeya, Steven Bernstein, Avery Cohn, Michael W. Stone and Benjamin Cashore. 2013. Methods and Global Environmental Governance. *Annual Review of Environment and Resources* 38: 441-71.

Pouliot, Vincent. 2015. Practice-tracing. In *Process Tracing: From Metaphor to Analytic Tool*, edited by Andrew Bennett and Jeffrey T. Checkel, 237-259. New York: Cambridge University Press.

Pulver Simone and Stacy D. VanDeveer. 2009. "Thinking about Tomorrows": Scenarios, Global Environmental Politics and Social Science Scholarship. *Global Environmental Politics* 9(2):1–13

Selin, Henrik. 2007. Coalition Politics and Chemicals Management in a Regulatory Ambitious Europe. *Global Environmental Politics* 7(3): 63-93.

Selin, Henrik and Stacy D. VanDeveer. 2003. Mapping Institutional Linkages in European Air Pollution Politics. *Global Environmental Politics* 3(3): 14-46.

Skjaerseth, Jon Birger, and Jorgen Wettestad. 2008. *EU Emissions Trading: Initiation, Decision-making and Implementation*. Hampshire: Ashgate.

Steinberg, Paul F. 2007. Causal Assessment in Small-N Policy Studies. *Policy Studies Journal* 35 (2): 181–204.

Steinberg, Paul F. and Stacy D. VanDeveer. 2012. *Comparative Environmental Politics: Theory, Practice, and Prospects*. Cambridge, MA: MIT Press.

Tjernshaugen, Andreas. 2012. Technological Power as a Strategic Dilemma: CO_2 Capture and Storage in the International Oil and Gas Industry. *Global Environmental Politics* 12(1): 8-29.

Torney, Diarmuid. 2015. Bilateral Climate Cooperation: The EU's Relations with China and India. *Global Environmental Politics* 15(1): 105-122.

Van de Graaf, Thijs. 2013. Fragmentation in Global Energy Governance: Explaining the Creation of IRENA. *Global Environmental Politics* 13(3): 14-33.

Vanhala, Lisa and Cecilie Hestbaek. 2016. Framing Climate Change Loss and Damage in the UNFCCC Negotiations. *Global Environmental Politics* 16(4): 111-129.

Vormedal, Irja. 2008. The Influence of Business and Industry NGOs in the Negotiation of the Kyoto Mechanisms: the Case of Carbon Capture and Storage in the CDM. *Global Environmental Politics* 8(4): 36-65.

Weinthal Erika. 2002. *State Making and Environmental Cooperation: Linking Domestic and International Politics in Central Asia*. Cambridge, MA: MIT Press

Zürn Michael. 1998. The Rise of International Environmental Politics: A Review of the Current Research. *World Politics* 50: 617–49.